

# iPads: How Safe Are Our Children?

By Michelle Wong

**I**n the past few years, iPad has become many adults' best friend and children's babysitter. It is used as a computer, eBook reader, camera, video/music player, word processor, communication device, drawing tool, game pad, and more.

Apple says, "Read all safety information below and operating instructions before using iPad to avoid injury."

The safety information provided with purchase is a small booklet of 3 1/4" x 5", with text so tiny it is practically illegible without magnifying glasses. As a result, most people have never read the following:

"iPad contains radio transmitters and receivers. When on, iPad sends and receives radio frequency (RF) energy through its antenna. The Wi-Fi and Bluetooth® antennas are located behind the screen to the left of the Home button, and behind the Apple logo... A cellular antenna is located at the top edge of iPad Wi-Fi+3G, when oriented with the Home button at the bottom."

When ifixit.com dissected a Wi-Fi+3G iPad, they discovered not three but five antennas, including the frame of the LCD screen being a giant antenna.

"... to be sure that human exposure to RF energy does not exceed the FCC, IC, and European Union guidelines, always follow these instructions and precautions: Orient the device in portrait mode with the Home button at the bottom of the display, or in landscape mode with the cellular antenna (located under the black edge at the top of the device) away from your body or other objects..."

This means if you don't handle the iPad exactly as instructed, the RF radiation can exceed governments' limits for human exposure. Unfortunately, most parents and teachers have no idea about this, and have never communicated the manufacturer's instructions to children who are using iPads.

The user manual recommends: "you can further limit your exposure by limiting the amount of time using iPad Wi-Fi+3G in wireless mode, since time is a factor in how much exposure a person receives, and by placing more distance between your body and iPad Wi-Fi + 3G, since exposure level drops off dramatically with distance."

## RF/EMF: 2B Possible Carcinogen

In 2011, the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) classified radiofrequency electromagnetic fields emitted by wireless communication devices as Type 2B Possible Carcinogen to Humans. The monograph states: "The general population receives the highest exposure from transmitters close to the body... In children... deposition of RF energy may be two times higher in the brain and up to ten times higher in the bone marrow of the skull than in adult users." The WHO report concluded that additional research is important and advised the public, particularly young adults and children, to take pragmatic measures to reduce exposure.

## Comparison between iPad and cellphone radiation

The published radiation level of mobile devices is called Specific Absorption Rate (SAR). An iPad on Wi-Fi/3G has an SAR of 0.76-1.19 W/kg, compared to the SAR of an iPhone on GSM/CDMA at 0.547-1.18 W/kg. Many other cellphones have even lower

SAR value than the iPhone.

Governments of some countries including Canada have issued warnings on children's use of cellphones. With iPad's radiation level being similar to cellphones, the same caution should be taken. Health Canada, "encourages parents to reduce children's RF exposure... since children are typically more sensitive" and "there is currently a lack of scientific information regarding the potential health impacts of cellphones on children."

Health Canada advises the following: Limit the length of cellphone calls; replace cellphone calls with text messages or use hands-free devices; and encourage children under the age of 18 to limit their cellphone usage.

Just as we would not put an actively transmitting cellphone against a child's head for hours a day, we should not put an actively transmitting iPad against the reproductive organ or other parts of a child's body for hours a day.

## 900 blasts of radiofrequency per hour

When the Wi-Fi antenna in an iPad is turned on, it emits a burst of radiofrequency approximately every four seconds. That makes 900 blasts per hour in the child's hands, on his lap, or at his face. This does not include any additional data signals resulting from uploading and downloading activities. Moreover, the blasts at four-second intervals occur even when the user is not accessing the Internet. In other words, even if a child is only using the iPad to draw or to play a game, he still receives 900 blasts an hour as long as the Wi-Fi antenna is left on.

Between 2008 and 2011, the European Union Parliament and the Council of Europe passed multiple resolutions against the "early, ill-considered, and prolonged use of mobiles and other devices emitting microwaves." Many medical associations in North America and Europe have also issued public statements to warn about the serious health risks associated with using wireless devices. Among them, the American Academy of Environmental Medicine wrote:

"In September 2010, the Journal of the American Society for Reproductive Medicine - Fertility and Sterility reported that only four hours of exposure to a standard laptop using WiFi caused DNA damage to human sperm."

"Multiple studies correlate radiofrequency exposure with diseases such as cancer, neurological disease, reproductive disorders, immune dysfunction, and electromagnetic hypersensitivity... Other neurological and cognitive disorders such as headaches, dizziness, tremors, decreased memory and attention, autonomic nervous system dysfunction, decreased reaction times, sleep disturbances, and visual disruptions have been reported to be statistically significant in multiple epidemiological studies with radiofrequency exposure occurring non-locally."

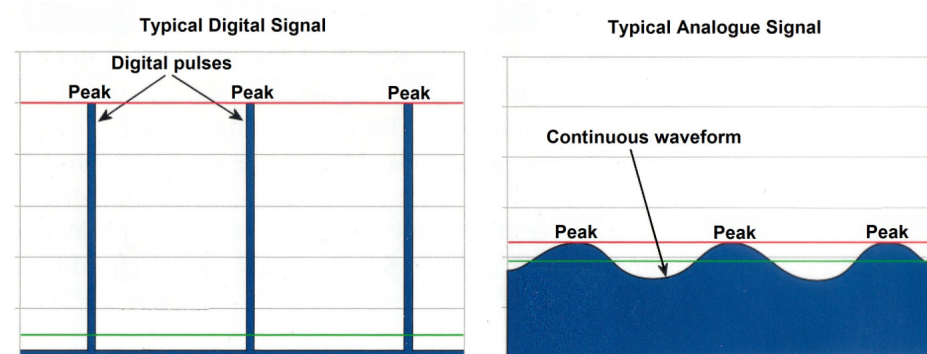
With the proliferation of the wireless industry, it might not be possible to eliminate all sources of RF radiation. However, a good start is to follow the European parliaments' advice for an exposure level called A.L.A.R.A. (as low as reasonably achievable). The following resolution was adopted by the BC Confederation of Parent Advisory Council this year. While these steps were proposed for schools, they are also useful for reduction of unnecessary exposure at home:

1. to provide on/off switches to Wi-Fi routers;
2. to establish a protocol of use that



Most parents don't know that children should keep their iPads away from the body and that antennas in the iPad should be turned off for children's use.

Photo: Michelle Wong.



These two diagrams illustrate the waveforms of (1) pulsed digital radiofrequency/microwave signals which have sharp spikes (WiFi, cellphone, DECT cordless phones, smart meters etc.) and (2) analogue radiofrequency signals with smooth waves (AM/FM radio). Credit:EMFfields

(i) WiFi routers and WiFi/3G functions of computers/laptops/tablets are to be turned on only when they are needed for access to the Internet via the wireless network; and,

(ii) Bluetooth function is to be turned on only if it is needed for accessing other Bluetooth-enabled devices.

3. to observe safety warnings and follow safety instructions in the user manual of iPad by reducing the duration of use under wireless mode and keeping the iPads away from the students' bodies.

Note that putting an iPad on airplane mode will initially turn off all antennas on the iPad. However, Wi-Fi and bluetooth antennas can be re-enabled without switching off the airplane mode. Therefore, an iPad showing airplane mode "on" is not a guarantee that all the antennas are off. It is important to check the antennas separately. In addition, when the Wi-Fi function on an iPad shows "Not Connected," it does not mean the antenna is off. It only means the iPad is not logged onto any available wireless network. To ensure the Wi-Fi antenna is turned off, the Wi-Fi function must read "off."

## Differences between the iPad and an AM/FM radio

The "radio" frequency emitted by iPad is often confused with AM/FM radio waves. The two actually differ in the follow-

ing ways: (1) AM/FM radio utilizes analogue signals with a continuous waveform (see diagram above). iPad (via 3G or Wi-Fi) emits digital signals in the form of pulsed microwave, similar to cellphone and DECT cordless phones. Pulsed microwave digital signal has sharp spikes in its waveform. (2) AM/FM radio is one-way transmission, with the listeners at the receiving end only. iPad antennas, on the other hand, work in constant two-way communication. iPad is not only a receiver but also a transmitter of pulsed microwave. The user of an iPad on wireless mode is in direct or close contact with the pulsed microwave signal at its source, which is the strongest.

For more information on wireless radiation, its health effects and scientific basis, and video of RF measurements, please visit the following websites: [www.safeinschool.org](http://www.safeinschool.org), [www.wiredchild.org](http://www.wiredchild.org), [www.citizensforsafetechnology.org](http://www.citizensforsafetechnology.org)

Michelle Wong was a member of the former WiFi Safety Subcommittee of the BC Confederation of Parent Advisory Councils. BCCPAC studied the WiFi issue for three years before adopting two resolutions in 2012 calling for choice and precaution in wireless network installation, and a third resolution in 2013 on reduction of radiofrequency exposure for children. Reference for this article: <http://goo.gl/AHE1Z>